



THE CRANE CORNER

Weight Handling Equipment Technical Bulletin

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A WORD FROM TOPSIDE

Reflecting on the events of 11 September, words cannot adequately express our feelings at this time. As we remember those who perished in the recent attacks on our country and our freedom, all Americans in and out of uniform will remain strong in our resolve to support and defend our country and our way of life. As our Navy responds to the Nation's call to achieve a resounding victory in this new war on terrorism, the entire Navy weight handling community can take heart in the fact that each and every one of us makes a valuable contribution to the successful execution of the Navy's mission.

Cranes and associated weight handling equipment are fundamental to the daily operation of the Navy. From naval stations, air stations, weapons stations, to shipyards, crane teams perform functions vital to the Navy's mission. In response to the recent attacks on our country, the Navy weight handling community will make contributions on many fronts to support the ships, submarines, squadrons, and other operating units around the world.

Human error contributes to 95 percent of all weight handling accidents — people not knowing what to do or not doing what they knew to do! The recent world events and our individual thoughts relating to those events present an additional risk to safe weight handling operations — thoughts intruding into our minds can divert our attention from the task at hand. The force of gravity acting on a suspended weight is constant and unrelenting. To conduct crane operations safely without accidents requires the full focus and concentration of every member of the crane team including operators, riggers, inspectors, engineers, mechanics, and other personnel involved with maintaining and certifying the crane and rigging gear. With the many thoughts present in our everyday lives associated with world events, all personnel involved in weight handling operations must be especially careful to stay focused on the safe execution of every single lift and crane movement.

The goal of the Navy's weight handling program is safe and reliable crane operations. We must execute smartly BUT safely!!



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We are dedicated to the Core Values of Honor, Courage, and Commitment to build the foundation of trust and leadership upon which our strength is based and victory is achieved. — Dept. of the Navy Core Values Charter

CLARIFICATION OF CRANE ALTERATION REQUEST PROCEDURES

Crane Alteration Requests (CAR) submitted to the Navy Crane Center (NCC) electronically will be accepted without signatures, but the names of the preparer, reviewer, and chief crane engineer (where applicable) must be filled in. The submitting activity will be responsible for instituting the administrative controls over this process.

CAR's are not required and should not be submitted for complex lift procedures, maintenance operations, and original equipment manufacturer's (OEM) optional crane configuration changes.


Submit CAR's for NCC approval for adjustments to drive parameters of microprocessor-controlled cranes where the range has not been provided by the OEM as appropriate for the crane design, or establishment of initial (if not provided by the OEM) or new (outside the range established by the OEM) drive parameters appropriate for the crane design.

CAR's intended for application to a number of cranes must designate those cranes by their unique identification numbers, capacity, type, and manufacturer. Do not use designations such as "general" and "various."


When a discrepancy between the design and as-built condition is discovered on a crane, a CAR titled "Documentation (as-built variance)" is required whether the intent is to retain or correct the as-built condition. Similarly, when non-compliance with a requirement (not a recommendation) of MIL-HDBK-1038 is discovered, a CAR titled "Documentation (MIL-HDBK-1038 variance)" is required whether the intent is to retain or correct the non-compliance.

NCC reviews locally approved CAR's submitted for information with the same level of attention as CAR's submitted for approval. These CAR's will be processed as follows:

- Locally approved CAR's with significant errors or deficiencies will be over-stamped "returned with comments" and returned to the submitting activity.
- Any further action on returned CAR's will be at the discretion of the submitting activity. If a corrected/revised CAR is resubmitted, it should be identified by revision letter "A" or the next sequential letter after the previous revision.
- NCC use of the "reclassified" designation will be limited to those CAR's that, according to NAVFAC P-307, section 4, were improperly locally approved.

Copies of CAR forms, standing crane alterations, quarterly crane alteration summary reports, and instructions for registration are available on our web site <http://ncc.navfac.navy.mil>. (Registration is required to access these files.) 

SHARE YOUR SUCCESS

We are always in need of articles from the field. Please share your "sea stories" with our editor. 

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WEIGHT HANDLING EQUIPMENT CONFERENCE

The Navy Crane Center (NCC) will host a Weight Handling Equipment (WHE) Conference 14-16 May 2002. The purpose of the conference is to share WHE improvement practices and safety initiatives as well as to discuss common issues with the goal of further improvements in WHE safety, maintenance management, engineering, and operations.

Some of the topics envisioned for presentation include historical review of Navy WHE accidents, human factors in WHE accidents, shipyard accident prevention initiatives, oil analysis, mobile crane acquisition, and NCC updates on various programs. Working group sessions are also planned with discussions focused on specific areas, which may include safe rigging practices, wire rope inspections, certification issues, safe operating practices, accident investigation techniques, and engineering issues.

All Navy shore activities and shore-based operational units with WHE are invited to attend and participate.

We have received responses from many activities and request that interested activities that have not as yet responded please do so with approximate number of attendees by 19 October 2001. Please indicate if you are able and available to make a presentation on any of the above noted initiatives or other issues of particular interest. We will send the final agenda, lodging, and other pertinent information via message, when available. ■

HAVE YOU HEARD ABOUT?

A metal oxide varistor (MOV) is a device used to protect electronic equipment from damage due to transient pulses of voltage exceeding the equipment's rating. The electrical resistance of an MOV varies with the voltage applied to it. Its electrical behavior is similar to back-to-back Zener diodes. At lower voltages, its resistance is high, while at higher voltages, its resistance is low. Thus, current at high voltages is shunted away from the electronic equipment the MOV is protecting.

The potentially destructive energy of a transient pulse is not conducted back to its source through the MOV but rather is absorbed by the MOV. Heat energy generated in the process has to be dissipated. This is typically done using restricted air convection or silicone-rubber transfer systems.

A series of MOV's, with a new method of thermal protection, is now available. They incorporate an integrated thermal protection element (patent-pending) within the body of the device which will open-circuit the MOV in case of overheating due to over-voltages. This also eliminates the need for separate overcurrent protection devices for MOV's. These new MOV's have higher peak surge current ratings and higher energy absorption capability than standard MOV's. ■

THIRD QUARTER FY01 CRANE ACCIDENT REPORT

The Navy Crane Center (NCC) disseminates crane accident lessons learned to prevent repeat accidents and improve overall crane safety. NAVFAC P-307 requires commands to submit a final, complete accident report (including corrective/preventive actions) to the Navy Crane Center (NCC) within 30 days of an accident, regardless of severity or type. In addition, contracting officers are required to forward to NCC reports of contractor accidents involving fatalities, in-patient hospitalization, overturned cranes, collapsed booms, or other major crane or property damage.

In the third quarter of FY01, 54 Navy WHE accidents and two contractor WHE accidents were reported. Serious accidents this quarter included one near fatality, four other injuries, one dropped load, four overloads, and three two-blockings.

NEAR FATALITY

Accident Background: A crane team was preparing to lift and place a 100-foot long steel roof beam, consisting of four sections bolted together, with a mobile crane. It was assumed that the bolted connections were fully tightened. On the day of the lift, it was discovered that some bolts needed to be tightened. Although the weight of the load was available, it was not given to the rigger. He assumed the weight and underestimated it. Web slings were used in a choker hitch and the size selected was inadequate for the estimated weight. In addition, the slings were significantly weathered and worn and probably should not have been used at all. Chafing protection was not used on the edges of the beam. The crane was not set up with its front wheels clear of the ground. Two people were permitted to work under the suspended load after it was lifted off the ground. This was a formula for disaster.

Accident: The slings failed and the beam fell to the ground. Luckily, there was some advance warning and one of the workers escaped injury. The other worker suffered a broken hand and an injured leg when his spud wrench, still attached to a bolt, punctured his thigh and calf.

Lessons Learned: Personnel must never be permitted to work directly under a suspended load. If workers need to work under a load, first safely support the load from the ground and relieve the load from the crane. This accident could have been much worse. Recently, a contractor employee was killed when a load suspended from a contractor crane broke free and fell on him. Riggers must know how to properly estimate the weights of loads to be lifted and how to determine properly sized rigging gear. Conduct a pre-use inspection of each piece of rigging gear. When in doubt about the condition of equipment, do not use it and/or notify the supervisor. Use chafing protection around sharp edges. Sharp edged objects easily cut web slings. Crane operators must follow all of the equipment manufacturer's safety, set-up, and operating procedures and precautions. If anyone has any doubts about any aspect of the lift plan, they must call a halt to the work and get the issues resolved.

OTHER INJURIES

Accident: A portal crane was lifting a load with taglines attached when a tagline holder, seeing that his tagline was snagged, pulled too hard on the tagline to free it from the load. This caused the snap hook, which was attached to the tagline to break free and strike him in the mouth.

Lesson Learned: Procedures for operating taglines, particularly with personnel not familiar with their use, should be discussed during the pre-lift briefing.

Accident: An operator was lifting a load from a lathe in a three-point pick rigging configuration (which consisted of two stiff legs and one leg with a chainfall attached) when the excess portion of the chainfall's load chain got caught on a section of the lathe table. The load chain became bound as the operator hoisted the load and then suddenly released, hitting the rigger on the hand.

Lesson Learned: Prior to a lift, inspect the load path for potential obstructions or interferences. Consider loose rigging components and the potential for snagging on objects in the lift path.

Accident: While an operator was traveling a portal crane to position it for a lift, the crane walker misjudged the distance between himself and the crane's travel truck motor. The travel truck motor contacted the crane walker's foot causing an injury.

Lesson Learned: Crane walkers should always be mindful of travel truck configurations and potential pinch points.

Accident: While rigging a test load for the 75-ton auxiliary hoist of a bridge crane, two of the four crane riggers were injured. One rigger injured his hand. He was holding on to the hook and was injured when another rigger prematurely placed a sling on the hook. Another rigger was injured while working on top of the test load when he stepped into a hole in the test weight. He fell four feet to the floor and injured his back.

Lesson Learned: Riggers should be aware of all potential hazards (e.g., pinch points, working above ground level). Don't rush the job. Take the time to do it safely.

DROPPED LOADS

Accident: A portal crane was being used to remove deck plates from a floating camel. During the second lift, a plate broke free from the plate clamp and fell three feet. The plates were rusty, which caused the clamp to slip.

Lessons Learned: Plate clamps must be used on clean metal. Rust build-up prevents an adequate grip. If necessary, use a more secure method for attaching the load to the crane.

OVERLOADS

Accident: A mobile crane was overloaded and became unstable when the operator was conducting an over-the-side stability test using the weight (10,750 pounds) intended for the over-the-rear test. Fortunately, the test load was close to the ground and came to rest, preventing the crane from overturning. The correct weight should have been approximately 7,000 pounds.

Lesson Learned: Test directors must ensure that the correct weight is used for the required test. Lift test loads only as high as necessary to perform the test.

Accident: A mobile crane was overloaded during a load test when the incorrect headache ball weight was included as part of the load deductions. The headache ball weight annotated on the test sheet was 340 pounds. Its actual weight was 560 pounds.

Lesson Learned: Test directors must ensure the correct deductions are taken into account when calculating test loads.

Accident: A monorail crane was overloaded when the test load (2,672 pounds) exceeded the maximum allowed by NAVFAC P-307. The maximum test load allowed was 2,625 pounds. The test director did not verify the weight of the test load prior to conducting the load test.

Lesson Learned: Test directors must verify that the weight of the test load is within the range allowed by NAVFAC P-307.

Accident: A mobile crane was overloaded during a load test when boom deflection caused the test load to move outside of the OEM's lifting radius.

Lesson Learned: Test directors must allow for potential boom deflection when siting and lifting test loads. Test loads should be lifted well within the allowable radius and boomed out to the test radius.

TWO-BLOCKINGS

Accident: While backing a mobile crane under a portal crane, the operator had to twist his body around to get a better view of his signalman. In doing so, he accidentally pushed the joystick for the main hook into the up position causing a two-blocking. The crane was in the rig-and-travel mode so the limit switch was not operational.

Lesson Learned: Operators should not have to turn around to see the signalman. If an operator cannot see the signalman, he/she should stop movement.

Accident: During an NCC audit, a bridge crane inspection was conducted and evidence of two-blocking was found. The inspection revealed damage to the upper equalizer sheave support structure, bent flanges on the upper equalizer sheave, and bent flanges on the load block. Date and time of accident was unknown.

Lesson Learned: Operators must perform a check of the crane prior to using equipment. Any damage found should be reported to the supervisor. If damage is to load bearing or load controlling parts or operational safety devices, do not operate the crane.

Accident: While setting up a crane for crane operations, the operator did not pay out sufficient wire rope on the hook block while he was telescoping the boom out and raising the boom. This caused the crane to be two-blocked.

Lesson Learned: The operator must not lose sight of the hook when telescoping the boom. Operate slowly if the hook block is approaching the boom block. Do not perform more operations simultaneously than can safely be controlled. If visibility is obstructed, rigger assistance should be requested.

SERIOUS CONTRACTOR WHE ACCIDENTS


Accident: A mobile crane overturned while lifting a load weighing approximately 12,800 pounds. The rated crane capacity for its lifting configuration was approximately 5,200 pounds. The operator did not know the weight of the load. The crane was set-up on an unstable surface. The crane was not equipped with a load-indicating device. There was no rigger assigned to assist the operator.

Lessons Learned: Cranes must be set up on a stable surface. Operators must know the weights of the loads being lifted or have a reasonable, conservative estimate of the load. Operators should not be assigned to mobile crane operations without rigger assistance.

Accident: A 90-ton capacity mobile crane's boom collapsed and the hoisted load of 43,000 pounds, which was being hoisted onto a steel pedestal, was dropped. The contractor indicated that when the operator hoisted and rotated the load, the crane shifted due to the unstable ground surface. This caused the boom to rotate into the pedestal, immediately collapsing the boom.

Lessons Learned: Cranes must be set-up on stable surfaces. Use proper spread footing support when setting up on questionable ground.

Serious crane accidents are still occurring and human error (e.g., inattention to detail) is the primary cause. Weight handling program managers and safety officials are encouraged to consider the potential risk of accidents similar to those highlighted above occurring at your activity and apply the lessons learned to prevent similar accidents. OPNAVINST 3500.39, Operational Risk Management, prescribes methods for assessing hazards and controlling and minimizing risks in hazardous operations. Activities should incorporate these principles into both training and day-to-day weight handling operations.

Last year, NCC distributed seven crane accident prevention "lessons learned" videos to assist activities in raising the level of safety awareness. These videos provide a very useful mechanism for emphasizing the impact that the human element can have on safe weight handling operations. 

P-307 QUESTIONS & INTERPRETATIONS

The questions and interpretations listed below are based on crane program issues that arise and Requests for Clarification, Deviation, or Revision, P-307, figure 1-1. They are also listed on our web page, <http://ncc.navfac.navy.mil/>. Click on P-307 and then P-307 Questions and Interpretations. They are arranged by the applicable section or appendix to the P-307.

Question: Self-Locking Worm Drives Used in Hoist Gearboxes. Are self-locking worm drives used in hoist gearboxes considered a mechanical brake and therefore subject to the annual disassembly and inspection requirements of NAVFAC P-307, appendix D, item 10?

Answer: Self-locking worm drives are not subject to the annual disassembly and inspection requirements of NAVFAC P-307, appendix D, item 10. They are covered by the inspection requirements of NAVFAC P-307, appendix D, item 8b. Additionally, electric brakes used in conjunction with self-locking worm gears on hoist drives are considered to be holding brakes and not stopping brakes for the purposes of the inspection and disassembly requirements of NAVFAC P-307, appendix D, item 13a-c.

Question: Training Requirements for Contractor Personnel Performing Minor Maintenance. Can contractors who are not manufacturer's representatives perform minor maintenance on category 3 cranes without attending the Navy Crane Center Crane Mechanic course? Oversight will be provided by an NCC trained Government representative who will inspect each crane maintenance job performed by contractors.

Answer: This deviation is approved for your minor maintenance only and provided that the NCC trained Government representative has passed NCC's Crane Electrician, Crane Mechanic, Crane Electrical Inspector, and Mechanical Crane Inspector courses. The Government representative must write the statement of work for the contractor to perform and must re-inspect the work after the contractor completes the job. All other P-307 requirements apply.

Question: Lot Testing of Wire Rope Lashing Versus Testing a Sample from Each Individual Reel. Is it allowable to test one piece of wire rope lashing from each manufacturer's lot instead of testing a sample from each spool or reel as required by NAVFAC P-307, paragraph 14.4.1?

Answer: Testing of one sample from a manufacturer's lot or master reel is acceptable in lieu of testing a sample from each individual spool or reel provided each individual spool or reel is traceable to the manufacturer's lot or master reel which provided the sample. ■

CRANE SAFETY ADVISORY

We receive reports of equipment deficiencies, component failures, crane accidents, and other potentially unsafe conditions and practices. When applicable to other activities, we issue a Crane Safety Advisory (CSA), an Equipment Deficiency Memorandum (EDM), or a "lessons learned" message. A CSA is a directive and often requires feedback from the activities receiving the advisory. CSA-101, Overheating of Circuit Breaker Used as Main Power Transfer Switch on a Westmont 60-Ton Portal Crane, was recently issued. ■